

Soaps and cleansers for atopic eczema, friends or foes? What every South African paediatrician should know about their pH

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Background. Knowledge of the pH level of soaps and cleansers used by patients with atopic eczema and sensitive skin is crucial, as high-alkalinity products are irritants and impair the normal skin barrier, so interfering with the adequate control of atopic eczema.

Objectives. The aim of this study was to assess the pH of various bar soaps and cleansers that are usually recommended and used by patients with atopic diseases and dry, sensitive skin in South Africa.

Methods. Forty-nine commercial soap bars and cleansers were randomly selected for pH analysis. The samples were prepared as 8% emulsions in tap water. Nine undiluted liquid facial cleansers were also evaluated. Deionised water was used as a negative control. The pH of each emulsion or liquid cleanser was recorded in duplicate using a Metrohm pH meter model 827 (Metrohm, Herisau, Switzerland).

Results. Of the 49 samples analysed, 34 (69.4%) were alkaline with a pH ranging from 9.3 - 10.7. Two samples (4.1%) were within the acceptable range of (5.4 - 5.9), and 2 samples (4.1%) had pH levels of below 5. In total, 5 samples (10.2 %) had a pH of 4 - 6.

Conclusion. The majority of soaps and cleansers analysed in this study were alkaline, with only 2 falling in the acceptable pH range of 5.4 - 5.9 and 5 within the pH range of 4 - 6, thus raising concerns regarding the optimal management of atopic eczema patients.

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Atopic eczema is a chronic, inflammatory disease of the skin, distinguished by xerosis, pruritus, and erythematous lesions often resulting from a defective skin barrier, usually measured as increased transepidermal water loss (TEWL) with prevalence ranging from 10% to 20% in the First-World countries and some urban African countries.^[1-5]

A study undertaken in Cape Town, South Africa (SA), on atopic children, showed a prevalence rate of 8.3%, with 2.3% of children presenting with severe disease symptoms.^[6] In a recent study on the epidemiology of skin conditions in 6 664 African patients in KwaZulu-Natal province, SA, eczemas were the second-most common conditions seen (15.9%), with atopic dermatitis (AD) the most common in children (7.2%).^[7]

A complex interaction of genetic, environmental and immunological factors has been implicated in the pathogenesis of atopic eczema.^[5] Studies have demonstrated the pivotal role of epidermal barrier dysfunction in AD; it results in the down-regulation of cornified envelope genes, reduced ceramide levels in the stratum corneum (SC), elevated levels of endogenous proteolytic enzymes, and increased TEWL.^[11-13] It is compounded by a lack of endogenous protease inhibitor, which perpetuates a cycle of barrier destruction.^[1,2,4] Certain soaps and detergents increase endogenous protease activity, elevating SC pH levels and causing barrier dysfunction.^[1,2] Knowing the pH levels of the soaps and cleansers used by patients with sensitive skin is crucial, as alkaline pH products are skin irritants. The irritation often leads to an impairment of the normal skin barrier, interfering with adequate control of atopic eczema. The skin pH values vary from 4.0 to 7.0. Although the body's internal pH tends to be neutral to slightly alkaline, the normal adult SC is decidedly acidic, with reported values ranging from 4 - 6.^[14] It has been shown that skin with pH values of <5.0 is in a better condition regarding the skin barrier function, moisturisation and scaling.^[15]

Lambers *et al.*,^[15] assessed the impact of pH on adhesion of normal bacterial flora and showed that an acidic skin (pH 4.0 - 4.5) maintained the attachment of the skin commensals, whereas an alkaline skin (pH 8.0 - 9.0) encouraged the dispersal from the skin, confirming that a skin surface pH<5.0 is beneficial for resident flora.^[15]

The use of detergents to clean human skin is a widespread phenomenon. It works by emulsifying the skin-surface lipids that are subsequently removed using water. Most soaps and cleansers sufficiently remove skin surface dirt; however, this may cause long-term interference of the skin-barrier function, manifesting as dry, red, itchy and inflamed skin, particularly in atopic and elderly patients.^[16] Although some detergents are safe to use, highly alkaline detergents affect the physiologically protective 'acid mantle' of the skin by decreasing the fat content.^[16,17]

Soaps and detergents can increase skin pH, disrupting the SC and inducing irritant contact eczema and pruritus, which seem to be worse during winter, particularly in patients with atopic eczema and those with dry and sensitive skin.^[2,16] The cutaneous changes are usually cumulative and indiscernible, having a greater impact on the elderly and atopic individuals.^[19,20] Diligent use of moisturisers, soap substitutes and replacement of irritating wash products with moisturising ointments and oils form the backbone and are first-line therapy for atopic eczema.^[21]

Special soaps and cleansers purported to be safe for use in patients with AD and dry sensitive skin are readily available on the market. However, the veracity of their claims has not been investigated, as the majority of these soaps and shampoos do not disclose their pH values.^[22]

In SA, both paediatricians and patients recommend and purchase soaps in supermarkets and pharmacies without background knowledge of product pH levels.

The aim of this study was to assess the pH of a group of soap bars and cleansers commonly used by patients with atopic and dry sensitive skin in SA. This was to provide clinicians and patients with the knowledge to make informed choices regarding their skin-care products.

Methods

Commercial soap bars ($n=38$) and cleansers ($n=11$) were randomly selected for pH analysis from the shelves of supermarkets, pharmacies, cosmetics shops, as well as those sold by hawkers on the streets of Durban, SA.

Table 1. Soap brand names and pH values

Brand name	pH value
1 Green bar soap	10.75
2 PnP green beauty soap	10.66
3 Breeze bar soap	10.36
4 Sunlight bar soap	10.34
5 Pond's facial bar	10.30
6 Nivea cream soap	10.27
7 Gentle-magic skincare soap	10.26
8 Savlon hygiene soap	10.25
9 Bee Natural rich care family soap	10.22
10 Elizabeth Anne's baby aq. cream bar	10.19
11 Beauty Magic facial soap bar	10.18
12 Vinolia luxury body soap	10.16
13 Lux beauty soap	10.10
14 Cuticura hygiene soap	10.10
15 Skin beauty soap	10.08
16 Dettol hygiene soap	10.05
17 Protex for Men AntiGerm soap	10.04
18 Clean & Clear facial cleansing bar soap	9.99
19 Germex hygiene soap	9.99
20 Mvelo magic treatment	9.98
21 Lemon-Lite complexion soap	9.93
22 Lifebuoy hygiene soap	9.93
23 Lifebuoy (clini-care) advanced hygiene soap	9.89
24 AquaBar	9.80
25 Pure soap	9.71
26 Palmolive naturals bar soap	9.71
27 Epiwash	9.70
28 Oh So Heavenly milk proteins moisturising glycerine bar	9.65
29 Hydra (aq. Cream & Glycerine) soap	9.57
30 Aqua-bar cleansing bar	9.42
31 Pears transparent soap	9.42
32 Protex AntiGerm soap	9.41
33 Tru Essentials bar soap	9.38
34 Clinique	9.36
35 Garnier smoothing facewash	8.41
36 Dove beauty cream bar soap	7.21
37 Cetaphil	7.26
38 Dove 4 Men body & face bar soap	7.11
39 Johnson's facial wash	6.89
40 Clean & Clear facial wash	6.86
41 Aqueous moisturising cream used as soap substitute	6.79
42 Cetaphil gentle cleanser	6.44
43 Pond's face wash	6.39
44 Cuticura face wash	5.92
45 Gill face wash	5.85
46 Garnier deep clean face wash	5.84
47 Himalaya Herbals gentle	5.28
48 Bioclear purifying face wash	4.68
49 Clearasil gel wash	3.74

aq. = aqueous.

Selection criteria

- Word-of-mouth recommendations for soap and cleansing liquids for sensitive or atopic skin from pharmacies or beauty shops.
- Soap bars or cleansers labelled as safe for dry or sensitive skin.
- Prescribed products by healthcare professionals.
- All atopic patients interviewed at a major referral skin centre at King Edward Hospital.

In the interview, patients stated their personal brand-name soap or cleanser. The majority of interviewees (70%) used the green sunlight laundry soap. All of the other soaps and cleansers mentioned were also purchased for the analysis.

Soap emulsions

The samples were prepared as 8% emulsions in tap water.^[23] Nine undiluted liquid facial cleansers were also included in the study and deionised water was used as a negative control.

Determination of pH

The pH of each emulsion or liquid cleanser was recorded in duplicate using a Metrohm pH meter model 827 (Herisau, Switzerland), according to manufacturer's instructions.

Results

The pH of the 38 soap bars and 11 cleansers ranged from 7.11 - 10.75 and 3.74 - 6.89, respectively. Thirty-four soap bars had pH values ranging from 9.36 - 10.75. Two cleansers had pH of 5.84 and 5.83 (range between 5.4 - 5.9). Two cleansers had a pH below 5, with a total of 5 cleansers within the normal skin pH range. The results of the soap and cleanser analyses are presented in decreasing order of pH values (Table 1).

Discussion

The results of this study showed that only 5 of the samples had a pH in the 4 - 6 range, with only 2 samples below pH 5, and 2 between pH 5.4 and 5.9. The majority of the soaps had an alkaline pH. The soaps and shampoos commonly used by the studied population have a pH outside the range of normal skin pH.^[15]

The importance of soap pH and its potential to irritate the skin is an area that has been underscored in the medical fraternity. Furthermore, the lack of proper product labels makes it difficult to get this information from the packaging. It is essential that prior to recommending a soap to a patient, due consideration is given to the pH factor. Manufacturers must be encouraged to declare the pH of soaps and cleansers, thereby assisting consumers and healthcare workers to make informed choices.

The green sunlight laundry soap was the most (70%) frequently used soap and it showed one of the highest pH values of 10.34. It should therefore be discouraged for use by atopic eczema patients and those with sensitive skin. It was interesting to note that some of the soaps with persuasive package labels like Oh So Heavenly milk proteins moisturising glycerine bar (9.6), Hydra (aq. cream & glycerine) soap (9.5) and Aqua-bar cleansing bar (9.4), which are targeted at atopic and sensitive skins, had high pH values. Aqueous cream which is used commonly by some as a moisturiser, and as a soap substitute by others, had a pH of 6.7. None of the soaps analysed in this study had the pH value displayed on the package insert.

The most commonly used soaps were also found to be less expensive per gram. Affordability may explain their frequent use, as few patients were able to afford the more desirable yet more expensive soaps.

Limitations of the study

A number of soaps and cleansers are manufactured under different brand names. Hence we cannot conclude that the findings are representative of all of the soaps/cleansers on the market. The absence of the pH value on

the soap labels made comparison with our results difficult. It would have been useful to compare the findings from the study with the actual pH value on the labels of the soap/cleanser.

Conclusion

The majority of soaps and cleansers analysed in this study were alkaline. Only 2 were in the acceptable pH range of 5.4 - 5.9, and 5 within the pH range of 4 - 6, thus raising some concerns with regards to optimal management of atopic eczema patients.

Patient education programmes and information on what soaps to avoid should be made easily available in order to enlighten the general population and clinicians.

Better regulation of advertisement specifications, including the pH level and type of cleanser contained is necessary for the majority of soaps and cleansers.^[16]

We hope that the compiled list of analysed soaps will help as an easy desk reference and assist paediatricians to make better choices when recommending soaps and cleansers to patients with atopic eczema and to elderly patients (Table 1).

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